

WHAT IS CLAIMED IS:

- Sub  
A2
- 10016054-100604
1. A printhead for delivering a solvent free marking material to a receiver comprising:  
a discharge device having an inlet and an outlet, a portion of the discharge device defining a delivery path, a portion of the discharge device being adapted to be releasably connected to a pressurized source of a thermodynamically stable mixture of a fluid and a marking material at the inlet, the discharge device being configured to produce a shaped beam of the marking material, the fluid being in a gaseous state at a location beyond the outlet of the discharge device; and  
an actuating mechanism positioned along the delivery path, the actuating mechanism having a first position removed from the delivery path and a second position in the delivery path.
  2. The printhead according to Claim 1, wherein the discharge device includes a variable area section.
  3. The printhead according to Claim 2, wherein the discharge device includes a constant area section.
  4. The printhead according to Claim 1, wherein the discharge device includes a first variable area section connected to one end of a first constant area section, and a second variable area section connected to an other end of the first constant area section.
  5. The printhead according to Claim 4, wherein the diameter of the first constant area section is from about 20 microns to 2,000 microns.
  6. The printhead according to Claim 1, wherein the actuating mechanism includes a position controllable actuating mechanism.
  7. The printhead according to Claim 1, wherein the actuating mechanism includes a solenoid actuating mechanism.

8. The printhead according to Claim 7, wherein the solenoid actuating mechanism is actuatable at a plurality of frequencies.

9. The printhead according to Claim 6, wherein the position controllable actuating mechanism is positioned adjacent to a solenoid actuating mechanism.

10. A canister adapted for use with the printhead according to Claim 1, the canister comprising:

a predetermined amount of a marking material and a supercritical fluid in a thermodynamically stable mixture, wherein the canister is releasably connectable to a discharge device.

11. A printing apparatus comprising:  
a pressurized source of a thermodynamically stable mixture of a fluid and a marking material;  
a printhead, portions of the printhead defining a delivery path, the delivery path of the printhead being connected to the pressurized source, the printhead including a discharge device, the discharge device having an outlet, a portion of the discharge device being positioned along the delivery path, the discharge device being shaped to produce a shaped beam of the marking material, the fluid being in a gaseous state at a location beyond the outlet of the discharge device; and  
an actuating mechanism positioned along the delivery path, the actuating mechanism having an open position at least partially removed from the delivery path.

12. The printing apparatus according to Claim 11, further comprising:  
a receiver retaining device positioned a predetermined distance from the outlet of the discharge device.

Sub  
AZ  
cont

10016034 130601

13. The printing apparatus according to Claim 12, wherein the printhead is rigidly connected to the pressurized source such that the printhead is stationary, the receiver retaining device being moveably positioned relative to the printhead.

14. The printing apparatus according to Claim 13, wherein the receiver retaining device is moveable in a first direction and a second direction relative to the printhead.

15. The printing apparatus according to Claim 14, wherein the second direction is substantially perpendicular to the first direction.

16. The printing apparatus according to Claim 12, wherein the printhead is flexibly connected to the pressurized source, the printhead being moveable in at least a first direction, the receiver retaining device being moveably positioned relative to the printhead.

17. The printing apparatus according to Claim 16, wherein the receiver retaining device is moveable in a second direction relative to the printhead, the second direction being substantially perpendicular to the first direction.

18. The printing apparatus according to Claim 12, wherein the printhead is releasably connected to the pressurized source.

19. The printing apparatus according to Claim 18, wherein the printhead is moveable in a first direction relative to the receiver retaining device.

20. The printing apparatus according to Claim 19, wherein the receiver retaining device is moveable in a second direction relative to the printhead, the second direction being substantially perpendicular to the first direction.

Sub  
Ar  
Cont

10016054-120601

21. The printing apparatus according to Claim 12, wherein the receiver retaining device is rotatably positioned at a predetermined distance from the outlet of the discharge device.

22. The printing apparatus according to Claim 21, the receiver retaining device being rotatable in a first direction, wherein the printhead is movable in a second direction substantially perpendicular to the first direction.

23. The printing apparatus according to Claim 21, a portion of the receiver retaining device being hollow, wherein the printhead is moveably positioned within the hollow portion of the receiver retaining device.

24. The printing apparatus according to Claim 23, the receiver retaining device being rotatable in a first direction, wherein the printhead is movable in a second direction substantially perpendicular to the first direction.

25. The printing apparatus according to Claim 11, wherein the pressurized source of the thermodynamically stable mixture of the fluid and the marking material is positioned on the printhead.

26. The printing apparatus according to Claim 11, further comprising:  
a source of fluid connected to the pressurized source.

27. The printing apparatus according to Claim 11, further comprising:  
a source of marking material connected to the pressurized source.

28. The printing apparatus according to Claim 11, wherein the pressurized source includes an inlet adapted to receive the marking material.

29. The printing apparatus according to Claim 11, wherein the discharge device has a variable area section.

Sub  
B2  
ant

10016054-120001

30. The printing apparatus according to Claim 29, wherein the discharge device includes a constant area section.

31. The printing apparatus according to Claim 50, wherein the discharge device includes a first variable area section connected to one end of a first constant area section, and a second variable area section connected to an other end of the first constant area section.

32. The printing apparatus according to Claim 31, further comprising: a second constant area section connected to the second variable area section.

33. The printing apparatus according to Claim 31, the second constant area section having a first predetermined diameter, the second variable area section having a second predetermined diameter, wherein the first predetermined diameter is substantially equal to the second predetermined diameter.

34. The printing apparatus according to Claim 33, wherein the second predetermined diameter is a maximum diameter of the second variable area section.

35. The printing apparatus according to Claim 31, the first constant area section having a third predetermined diameter, the first variable area section having a fourth predetermined diameter, wherein the third predetermined diameter is substantially equal to the fourth predetermined diameter.

36. The printing apparatus according to Claim 35, wherein the fourth predetermined diameter is a minimum diameter of the first variable area section.

37. The printing apparatus according to Claim 31, wherein the diameter of the first constant area section is from about 20 microns to 2,000 microns.

Sub  
Ar  
Cant

10016034 120301

38. The printing apparatus according to Claim 37, wherein the diameter of the first constant area section is from about 10 microns to about 20 microns.

39. The printing apparatus according to Claim 31, the first constant area section having a predetermined length, wherein the length of the first constant area section is from about 0.1 to about 10 times the diameter of the first constant area section.

40. The printing apparatus according to Claim 11, wherein the actuating mechanism includes a position controllable actuating mechanism.

41. The printing apparatus according to Claim 40, wherein the actuating mechanism includes a solenoid actuating mechanism.

42. The printing apparatus according to Claim 41, wherein the solenoid actuating mechanism is actuatable at a plurality of frequencies.

43. The printing apparatus according to Claim 40, wherein the position controllable actuating mechanism is positioned adjacent to the solenoid actuating mechanism.

44. The printing apparatus according to Claim 11, wherein the actuating mechanism includes a conical sealing element moveable between the open position and a closed position.

45. The printing apparatus according to Claim 11, wherein the actuating mechanism includes a disc shaped sealing element moveable between the open position and a closed position.

46. The printing apparatus according to Claim 12, further comprising:  
a receiver positioned on a surface of the receiver retaining device.

Sub  
A2  
cont

1001603# 120604  
1001603# 120604

47. A method of printing comprising:

providing a pressurized source of a thermodynamically stable mixture of a solvent and a marking material;

connecting the pressurized source of the thermodynamically stable mixture of the solvent and the marking material to a printhead;

positioning a receiver at a predetermined distance from the printhead; and

causing the marking material to become free of the solvent such that a solvent free marking material contacts the receiver.

48. The method according to Claim 20, further comprising

dithering the printhead.

Sub  
A2  
cont

10016054-120601